



Breastfeeding and Blogging: Exploring the Utility of Blogs to Promote Breastfeeding

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ABSTRACT

Background: People are increasingly using the Internet and social networking sites for behavior support. Almost no literature exists exploring the utility of these sites for supporting breastfeeding behavior. **Purpose:** The purpose of this study was to determine the extent to which blogs are currently being used to support breastfeeding behavior. **Methods:** Data for this study came from a sample of 32 active blogs, resulting in 354 posts and 881 comments for analysis. Evidence of intent to support behavior was determined by the presence of theoretical behavior support constructs from the Integrated Behavioral Model. **Results:** In posts, attitudes (28.5%), behavioral cues (23.8%), and consciousness-raising (25.3%) appeared frequently. Praise (43.3%), behavioral cues (37.4%), and attitudes (30.4%) were the most prominent constructs in comments. More behavior support appeared on industry-affiliated blogs than on private blogs. Posts that presented mostly information only were least effective at eliciting behavior support. **Discussion:** Blogs are being used to support breastfeeding behavior, and blogs with industry affiliation appear to offer more support. **Translation to Health Education Practice:** Health educators wishing to support breastfeeding may use blogs and may want to partner with industry. Such efforts might also focus on functional content knowledge aimed at supporting breastfeeding behavior.

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BACKGROUND

Blogs are an example of an online community and social networking site, which have become popular over the past decade.¹ In addition to functioning as a personal online diary, a blog is a web-based location where people come together and socialize. It is a place where the creator (and other registered guests) can compose original text in the form of a post. Posts address many topics, but they usually include personal themes,² such as opinions or recent experiences. Users comment in response to the original post, much in the same way newspaper and radio programs produce original pieces and then receive feedback in the form of letters to the editor.

Research evidence suggests that blogs serve the needs of and strengthen existing social networks and can also be a catalyst for

developing new connections.³⁻⁵ Indeed, blog creators and registered guests sometimes share a connection independent of their

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postings and comments.^{3, 4} Papacharissi⁶ showed that most content on personal blogs was intended to be read by friends and family, groups that already share social connections. Blogs are also capable of bringing groups together to both forge and strengthen new social network bonds.^{5, 7, 8} This happens when individuals participate in a blog that revolves around a common theme (e.g., cancer survivorship), but where the individuals have little or no previous contact or awareness of each other. Either way, one commonality among blogs is that they tend to feature a strong sense of community.⁹

Several different types of blogs exist: (1) personal blogs, representing a lay person's blog on any topic of personal interest; (2) topic or industry blogs, representing authoritative and influential bloggers on a subject area or industry; (3) publication-based blogs, typically editors or reporters who stimulate discussion of a certain topic; and (4) corporate blogs, representing corporate executives or board members who blog about a single company.¹⁰ Topic or industry blogs "function nearly like an ongoing white paper or keynote speech - as if to impart sage wisdom to others who, for example, need or want to know what the state of the subject is, where it's going, and what stands to be gained or lost with or without proper action."^{10(p. 35)}

Breastfeeding and Behavior Support

Breastfeeding is a health behavior with many documented benefits for both mother and child. In most cases, breastfeeding is optimal for the child's growth. Exclusive breastfeeding for the first six months of a child's life is the best and most cost-effective intervention to provide newborns with much needed nutrients and to improve infant and children survival rates.¹¹ Additionally, mothers that breastfeed decrease their risk for breast cancer.¹²

Despite the empirical support for breastfeeding, rates remain low.¹³ Frequently cited psychosocial determinants of breastfeeding include such things as attitudes,¹⁴⁻¹⁷ beliefs about the benefits of breastfeeding,^{14, 18-20} self-efficacy,²⁰ social support,^{17, 18, 21, 22} and normative beliefs of family members,^{14, 15, 23, 24}

friends and society.^{16, 18, 19, 25} Whereas traditional counseling techniques have not been effective at overcoming many psychosocial barriers,²⁶ behavior support delivered via blogs may be an effective strategy for tailoring approaches aimed at addressing common psychosocial determinants.

Providing new mothers with adequate behavior support for breastfeeding holds promise in overcoming breastfeeding difficulty. Both informal (family, friends) and professional (health care professionals) social networks aimed at providing social support for breastfeeding have been identified as effective tools for breastfeeding promotion.²⁷ Indeed, practitioners such as physicians, nurses, midwives and lactation specialists are well positioned to provide meaningful breastfeeding behavior support.¹⁷ Consistent with these findings, Dennis²⁸ recommended a telephone peer support program to match new mothers with experienced breastfeeding mothers in the same community. The experienced mother can then provide the necessary behavior support through positive role modeling and verbal persuasion needed to help the new mother overcome breastfeeding difficulties. Utilizing online social networking mediums may provide a new and more efficient strategy, as well as increased accessibility, for providing this type of breastfeeding behavior support.

Social support is a generic term for behavior support from social sources. Constructs prominent in health behavior change theories can be used to operationally define social support in useful terms for health educators. The current study draws heavily upon constructs adapted from the Integrated Behavioral Model.²⁹⁻³² This model defines behavior support as efforts to influence behavioral intentions through attitudes, social norms, and self-efficacy, which are commonly cited psychosocial determinants of breastfeeding. These constructs are influenced by an individual's perceptions regarding such things as the benefits from engaging in the behavior or possible barriers. The model's value for this study rests in its integration of constructs from numerous influential theories. There-

fore, its robustness enhances its applicability to women from diverse cultures and ideologies that wish to breastfeed.

PURPOSE

While the Internet has been studied extensively, blogs have received much less scholarly attention,³³ especially those that discuss topics other than politics.³⁴ Yet, research in computer-mediated behavior support would benefit by examining the use of blogs.⁵ Recent research in Internet-based behavior support approaches has largely focused on tobacco control and, to a lesser extent, physical activity,³⁵ with very little emphasis on promoting other healthy behaviors, such as breastfeeding. Using behavior support constructs from the Integrated Behavioral Model, the purpose of this study was to determine the utility of using blogs to promote breastfeeding. This was accomplished by answering the following three research questions: (1) To what degree are constructs from prominent health behavior change theories included in blog posts and comments?; (2) Which venue (personal versus industry) is more supportive of breastfeeding behavior?; and (3) What type of blog post content elicits breastfeeding behavior support?

METHODS

Design

This study employed a qualitative and quantitative content analysis of breastfeeding blogs using a coding structure based on Eichhorn³⁶ which utilized data from posts and comments. The Integrated Behavioral Model²⁹⁻³² was used to identify and code constructs reflective of behavior support. The Brigham Young University institutional review board approved this study.

Sample

The sampling frame was identified through Google Reader and Google Alerts, online applications that provide a mechanism for monitoring when new Internet content has been added to a site (e.g., blog post). The authors specified in each application's preferences for notification



every time *breastfeeding* or any close variant (e.g., *breastfeed*) appeared in a blog. The service was initiated and continued for approximately four months. This methodology ensured a sample of active blogs. A total of 425 blogs were identified during the study period. Trained research assistants visited each blog and eliminated blogs that did not contain the word 'breastfeeding' or 'breastfeed' directly in the URL or blog title, which increased the chances for relevant breastfeeding content. The final sample comprised 32 blogs, consisting of 706 posts and 2,400 comments. Whereas blogs were identified over a four-month period, the entire post and comment history for the 32 blogs was used for this study. The large number of posts and comments was not feasible for this study, so a computerized random sampling approach was employed and resulted in a random sample of 50% of posts. This resulted in 354 posts and their associated 881 comments for analyses.

Measurement

Blogs. Blog-level variables included information about the blog's author (age, parity, expertise and gender) and the blog's affiliation (industry blogs versus private blogs). Four coding options were created for expertise and included layperson, non-medical professional, medical professional, and other. This information was derived from the author's profile. Professionals were defined as certified or degree holding individuals (e.g., lawyer) that were employed in their credentialed field. Medical professionals were professionals with an emphasis in the health or medical field (e.g., certified lactation specialist, certified nurse, certified health educator). Laypersons were nonprofessional individuals without specialized training (e.g., mothers, advocate, caretaker). Blog affiliation was coded using an adapted approach from Smudde¹⁰ and included personal, industry-affiliated and government/non-governmental organization (NGO) blogs. Personal blogs were those where the author clearly stated that the blog was personal (e.g., a pro-breastfeeding mother started a blog to support other mothers in breastfeeding). Industry-affiliated blogs

were those that had clear relationships with industry as indicated by logos, the blog title, or where they otherwise explicitly stated their affiliation. The types of observed industries that supported breastfeeding blogs included companies that sell maternity clothes, for-profit medical services, and baby accessories. Government/NGO blogs were those that were owned and maintained by a government agency or an NGO. Again, logos, the blog title, or explicit statement(s) of their sponsorship determined this affiliation. The category 'Other' existed, but only one blog was coded as such. No identifying information (e.g., blog author's name) was collected.

The coding approach employed in this study was adapted from Eichhorn³⁶ The individual message composition (post or comment) was the unit of analysis. A composition was what one person said, or the total content—regardless of whether it was a word or multiple paragraphs in length—of a single submission to the group.

Posts and their associated comments were the two units considered in this analysis. A post was a unique entry, authored by either the blog owner or a registered guest. A comment was an entry in response to a post. Measures from the following units are presented:

Posts and Comments. Each post and comment was individually assessed on five dimensions: size (number of sentences), provision of breastfeeding advice (Y/N), elapsed time between an author's post and any associated comment(s), the type of post/comment, and the presence of behavior support constructs. Post/comment type was coded as informational (content relating to process, history, procedures, outcomes or research related to breastfeeding), personal experience (content where an individual is reporting about their own breastfeeding experience), or social support (content where an individual offers encouragement).

The Integrated Behavioral Model³⁰⁻³² was used to identify prominent behavior change constructs. Constructs appear in Table 1 along with the definition used for coding in this study. To control for the potential likelihood that longer posts/comments may be

more likely to contain multiple constructs by virtue of them containing more text, a mean score for each construct was calculated by summing the total number of occurrences for each construct within a post or comment, then dividing by the total number of sentences for that post or comment.

Coding Reliability

Two trained research assistants conducted all of the coding. Inter-rater reliability between the coders was calculated using raw concordance scores. Scores were calculated by comparing the values coded by the two coders using a subsample of common posts and comments. Total concordance calculated was 90%.

Statistical Analyses

All analyses were conducted using SPSS version 18.0 for Macintosh. Descriptive statistics were calculated for all variables and were assessed to ensure appropriate and normal distributions. One-way analysis of variance was used to test for mean differences of behavior change constructs by blog affiliation.

RESULTS

Table 2 shows that of the total sample of blogs, most were dedicated to providing breastfeeding information. A smaller number of blogs focused on sharing personal experiences, followed by the smallest group, which was dedicated to providing social support. Equal proportions (37.5%) were industry and personal blogs, while government/NGO blogs accounted for 20.8% of the sample. However, most posts and comments came from either industry-affiliated or personal blogs. Government/NGO blogs only accounted for 5.1% of posts and 0.2% of comments, which was too few to derive meaningful conclusions. For this reason, posts and comments from government/NGO blogs were excluded from analyses, which only compared personal and industry-affiliated blogs. The purpose for both posts and comments was largely to report about behavior, rather than to give advice. Whereas most blogs did not specify the expertise of the author, layperson authors were the most commonly specified expertise,

**Table 1. Constructs and Corresponding Study Definitions**

Construct	Definition	Example
Attitudes	Overall feeling of like or dislike toward the behavior	"I love breastfeeding my baby"
Perceived barriers	A stated belief about the tangible and psychosocial costs of breastfeeding	"My work schedule prevents me from breastfeeding"
Behavioral cues	Comments or strategies to activate or trigger behavior	"You really should consider breastfeeding"
Perceived benefits	A stated belief about the benefits of breastfeeding	"Breastfeeding gives your new baby important nutrients"
Consciousness raising	A comment intended to alert someone else to the importance of breastfeeding	"Doctors recommend breastfeeding"
Intentions	Stated intent to breastfeed	"I am going to breastfeed"
Normative beliefs	Stated beliefs about what other important and significant people think about the behavior	"My mother thinks I should breastfeed"
Praise	Comments that are positive in nature, are in response to something, and appear to commend a behavior or an effort	"Good job, we are so proud of you for breastfeeding"
Self-efficacy	Stated confidence in one's ability to take action and perform a behavior	"I feel like I am going to be able to breastfeed my newborn"
Perceived severity	A stated belief regarding how serious it is not to breastfeed	"If you do not breastfeed, your baby is more likely to get sick"

Note: The constructs displayed in this table were selected based on the Integrated Behavioral Model.

followed by medical professionals and then non-medical professionals.

Are breastfeeding blogs currently being used to support behavior?

Table 3 shows the percentage of posts and comments that were coded as containing at least one of the behavior support constructs. A stated attitude—an overall feeling of like or dislike toward breastfeeding—was the most common construct in *posts*, appearing in 28.5%. It was the third most common construct in *comments* (30.4%). Consciousness raising was the second most prevalent construct in *posts* (25.3%), followed by behavioral cues (23.8%). Praise for breastfeeding was the most common construct in *comments* (43.3%), followed by behavioral cues (37.4%). *Posts* also included barriers to breastfeeding (13.3%), benefits to breastfeeding (13.3%), and intentions to breastfeed (10.2%).

Which blogging venue is more supportive of breastfeeding behavior?

Intentions, perceived severity, self-efficacy and normative beliefs were excluded from Table 4 because they were not adequately represented in each of the designated categories. The data in this table show a comparison between personal and industry blogs. Behavior change constructs for comments and posts were compared. For *comments*, the mean occurrence of attitudes and behavioral cues were significantly higher in industry-affiliated blogs ($P < 0.05$). For *posts*, attitudes, discussion of perceived barriers and benefits, provision of behavioral cues, consciousness raising, and praise were all significantly higher for industry-affiliated blogs, compared to private or personal blogs ($P < 0.05$). *Posts* on private or personal blogs were significantly longer ($P < 0.05$), while *comments* were

significantly more delayed, meaning at least one day had elapsed between the post and the comment ($P < 0.05$).

What type of blog post content elicits breastfeeding behavior support?

Table 5 displays the results of an exploratory analysis completed to determine the type of *posts* that elicited the greatest presence of behavior change constructs in comments. Posts that were mostly dedicated to providing advice did little to elicit praise in comments, but they did significantly elicit comments about attitudes toward breastfeeding. Posts that did not provide advice were significantly more likely to elicit behavioral cues in comments. Posts containing reports about one's own behavior were more likely to elicit behavioral cues in comments. These types of posts were also more likely to elicit quick responses (e.g., comments within one day). Lastly, posts composed of personal

**Table 2. Descriptive Information about Blogs, Posts and Comments**

	Blogs	Posts	Comments
Size ^a	-	12.8 (14.9)	5.65 (30.5)
Type			
Information	-	29.6%	8.2%
Social support	-	1.2%	9.9%
Personal experience	-	47.2%	41.7%
Combination ^b	-	21.9%	40.3%
Affiliation			
Personal	37.5%	17.6%	14.7%
Industry	37.5%	73.4%	77.5%
Government/NGO	20.8%	5.1%	0.2%
Other	4.2%	3.8%	7.7%
Purpose			
Gives advice	-	24.7%	43.3%
Reports about behavior	-	52.8%	59.3%
Time elapse from post to comment			
< 1 day	-	-	40.7%
> 1 day	-	-	59.3%
Author expertise			
Non-medical professional	12.5%	-	-
Medical professional	16.7%	-	-
Lay person	20.8%	-	-
Unspecified	50.0%	-	-

Note: A blog was the website where posts and comments were hosted; Posts were text compositions that were located on blog websites; Comments were text compositions, usually in response to posts; ^anumber of sentences, M(SD); ^bAny combination of at least two or more categories.

experience and social support elicited more behavioral cues and more discussion about attitudes toward breastfeeding and much quicker responses than did posts that provided just information.

DISCUSSION

The Internet is increasingly used as a medium for the delivery of interventions designed to promote health behavior change.³⁵ Most people in developed nations have dependable Internet access,³⁷

with young adults, aged 18-24 connecting most often.³⁸ Given the age of mothers of young children, they fit the demographic of frequent users, especially in developed nations where gender usage disparities are minimal.³⁹ Indeed, some of the most popular social networking sites for women include those related to motherhood.⁴⁰

The purpose of this study was to determine the utility of blogs in support of breastfeeding, even if no official intention to change behavior could be observed

on the part of the post/comment author. Rather, the presence of a theoretical construct in a post or comment was deemed to be important because the constructs have been shown empirically to be associated with behavior change.⁴¹

Our original research question related to the extent to which breastfeeding behavior support was being communicated on blogs, as measured by the presence of constructs from the Integrated Behavioral Model. Our findings indicate that behavior support is being communicated via blogs. Almost half of comments contain things such as praise, behavioral cues and attitudes toward breastfeeding. In posts, attitudes, behavioral cues and consciousness raising were all very prevalent. This might be because support blogs and other online support mechanisms are accessible through computers and phones that people use every day and thus are extremely convenient. The Internet's reach and impact has come a long way from being used primarily for email by professionals. While widespread access to the Internet in homes and connection speeds are increasing every year, many people are also now accessing the Internet through their mobile phones. Health behavior change choices, including breastfeeding, are often made in one's own home or another location, and not in clinical or group settings. If support for those decisions can be provided in the setting where the decision will actually be made and carried out, that support becomes highly accessible during critical decision-making moments.

Perceived severity was the least common construct in both posts and comments, which is not surprising since it also appears less in published literature about breastfeeding. Its obscurity in this study may also relate to individuals' desire to not focus on negative aspects of behavior, especially if they are not currently breastfeeding, or do not have plans to do so in the future. This may be reflective of one's desire to avoid what could be perceived as aggressive online communication relating to a personal health behavior choice and parenting practice.

After perceived severity, constructs such



as intentions, self-efficacy and normative beliefs were among the least common in posts and comments. This was unexpected since each has been shown empirically to influence breastfeeding behavior.^{15, 16, 19, 20, 24, 25} Racine¹⁸ cites differences in breastfeeding motivation between mothers that are intrinsically motivated and those that are extrinsically motivated. Favorable breastfeeding attitudes, which were prevalent in posts and comments in the current study, are characteristic of intrinsically motivated women. Extrinsically motivated women are largely influenced by their peers and have greater difficulty in overcoming challenges to breastfeeding.¹⁸ Additional research should be conducted to explore possible differences in breastfeeding support between offline and online settings to determine if these patterns in motivation are simply an artifact of an online setting.

Based on findings reported here, web-based behavior change efforts may be most effective if targeted specifically toward blogs that have an industry affiliation, versus personal blogs. This was determined by a greater presence of behavior change constructs in posts and comments on blogs with industry affiliations, when compared with personal blogs. This could relate to numerous issues, including the sensitive nature of breastfeeding, the efficiency of industry (and by implication, their blogs), and the visibility of industry-affiliated blogs (versus personal blogs), which may lend more credibility to the information contained therein. Whereas blog credibility was not measured in this study, it should be noted that credibility depends on the level of trust consumers have with the blogs' sponsoring institution.¹⁰ There is evidence to suggest that industry-related blogs are more credible than personal blogs. In the tourism industry, industry-affiliated or corporate blogs were shown to be more authoritative, an important measure of credibility, than personal blogs.⁴² Given these findings, Mack⁴² suggests that industry or corporate blogs can be useful in addressing consumer complaints - especially in the tourism industry. Berkowitz⁴³ extends this recommendation to healthcare institutions

Table 3. Prevalence of Constructs in Posts and Comments

Construct	Posts (%) ^a	Comments (%) ^a
Attitudes	28.5	30.4
Perceived barriers	13.3	3.7
Behavioral cues	23.8	37.4
Perceived benefits	13.3	4.5
Consciousness raising	25.3	8.1
Intentions	10.2	4.9
Normative beliefs	7.4	3.0
Praise	17.0	43.3
Self-efficacy	5.9	3.0
Perceived severity	4.0	0.7

^aReflects the % of posts/comments that had at least one occurrence.

that seek to better understand healthcare consumers' needs and complaints. In the case of breastfeeding behavior, industry blogging appears to be similarly used, not necessarily to address consumer complaints, but to assist with identifying and overcoming barriers and challenges to breastfeeding. It is unfortunate that government/NGO blog posts and comments were poorly represented in this study and therefore excluded, since blog users are likely to have high levels of trust toward the sponsoring institution(s), which would result in blog credibility.

As with many health behaviors,⁴⁴ breastfeeding is a sensitive issue that can require significant support to initiate and maintain. Mothers who breastfeed may experience setbacks or difficulties that can be embarrassing or uncomfortable to discuss with people who know their identity. While personal blogs may involve family members and close friends, industry blogs are likely populated by people who are otherwise strangers. The feeling of anonymity associated with industry blogs could help the post/comment author to express her feelings more freely and without fear of embarrassment.

Another difference pertains to the reason for the blog's creation. It is plausible that private blogs started first with the social network, then secondarily the topic of breastfeeding. Industry-affiliated blogs, on the other hand, probably started as a page on a company website or even as a stand-alone

site dedicated to breastfeeding information, but then later added a blog that attracted followers who share common interests but are otherwise unknown to other contributors. The industry affiliate might also engage in efforts to censor or screen blog content so messages are more concise. As a result of the different development process, the content of private blogs becomes filled with breastfeeding topics mixed with unrelated topics that the social network has in common, whereas this study found that industry-affiliated blogs contained more behavior support, and did so in fewer sentences. In essence, the blogs' purpose was to discuss breastfeeding, which is why the network formed.

Lastly, industry-affiliated blogs may do a better job than private blogs of bridging the gap between the health consumer and health professionals, something that is necessary for social networking to be effective at disseminating information.^{45, 46} For example, whereas a woman may be comfortable discussing breastfeeding questions with a professional, she may be hesitant to do so openly in the audience of a network consisting of family and close friends. The delivery of support and information through intermediary sources is called apomediation.⁴⁶ It characterizes the utilization of blogs to ascertain behavior change support for breastfeeding. The term refers to the decreased reliance on traditional professionals (e.g., MDs) and seeking guidance from peers on such venues

**Table 4. Comparison of Constructs in Posts and Comments by Blog Affiliation**

Construct	Comment, M (SD)			Post, M (SD)		
	Personal	Industry	P	Personal	Industry	P
Attitudes	0.49 (0.14)	0.55 (0.17)	<0.001	0.28 (0.28)	0.43 (0.15)	<0.001
Perceived barriers	-	-	-	0.28 (0.14)	0.40 (0.15)	<0.001
Behavioral cues	0.49 (0.15)	0.58 (0.17)	<0.001	0.29 (0.15)	0.44 (0.16)	<0.001
Perceived benefits	-	-	-	0.30 (0.15)	0.41 (0.16)	<0.001
Consciousness raising	-	-	-	0.33 (0.15)	0.43 (0.17)	<0.001
Praise	0.47 (0.13)	0.49 (0.14)	0.116	0.27 (0.14)	0.42 (0.16)	<0.001
Size	5.18	5.79	0.994	4.79 (2.09)	3.05 (1.28)	<0.001
Time elapsed (days)	7.19 (1.59)	5.74 (2.33)	<0.001	-	-	-

Note: One-way ANOVA was used to compare means (total number of constructs/total number of sentences in the comment or post) between personal and industry blogs; Government/NGO posts and comments were excluded because there were too few; anumber of sentences; brepresents the number of days between a post and the most recent associated comment; Barriers, Benefits, and Consciousness raising were excluded from comment comparisons because too few instances were coded. Goal setting, Intentions, Motivation, Normative beliefs, Punishment, and Self-Efficacy were excluded from both comment and post comparisons because too few instances occurred.

Table 5. Factors That Elicit Constructs in Blog Comments

Post characteristics	Comment Constructs, M (SD)							
	Praise	P	Behavioral cues	P	Attitudes	P	Response time ^a	P
Post gives advice		0.523		0.029		<0.001		0.432
Yes	0.48 (0.15)		0.49 (0.16)		0.59 (0.21)		75%	
No	0.49 (0.14)		0.57 (0.17)		0.55 (0.17)		70%	
Report about behavior		0.405		0.001		0.818		<0.001
Yes	0.48 (0.14)		0.58 (0.18)		0.53 (0.17)		73.5%	
No	0.49 (0.14)		0.53 (0.16)		0.54 (0.17)		56.8%	
Post type		0.118		0.001		0.003		<0.001
Information	0.46 (0.13)		0.48 (0.14)		0.49 (0.15)		22.0%	
Personal experience	0.49 (0.15)		0.59 (0.18)		0.54 (0.17)		71.9%	
Social support	0.52 (0.13)		0.60 (0.17)		0.66 (0.06)		-	

Note: One-way ANOVA was used to compare mean (total number of constructs/total number of sentences in the comment) praise, attitudes and behavioral cue values; Chi-square test statistic was computed to compare response time; ^aLess than one day latency to response.

as blogs.^{45, 46} However, individuals may still value the credibility of the source, which may explain the popularity of industry-affiliated blogs relative to personal blogs - ready access to a perceived credible source without having to work through traditional gatekeepers. This Internet-driven shift to decentralize medicine is characteristic of Health 2.0 approaches.⁴⁷

Posts that mostly report about personal behavior or experiences and provide social

support garner more in terms of behavior support comments, which has practical implications as far as what might be necessary for social networking tools (e.g., blogs) to be effective agents for supporting and maintaining behavior change. These sites may be effective only if they bring people together to share experiences and elicit support for change. It cannot be just a one-way pushing of information. Indeed,

Fahy⁴⁸ indicates that supportive groups in online settings are marked by the presence of polite greetings and references to others' comments, which is similar to what you find in or face-to-face settings. Reporting about one's own behavior may motivate others to change (e.g., behavioral cue) and may force dialogue, whereas simply providing information could be viewed as traditional one-way pushing of information, which was



common in previous generations of web-based approaches (e.g., Web 1.0).^{47,49} Mixing content with more conversational language may elicit the greatest amount of behavior change support.⁵⁰

The purpose of this study was not to evaluate the relationship between these theoretical constructs and breastfeeding, as these constructs have already risen to the level of theoretical components based on empirical testing. Furthermore, they are believed to be causally related to behavior and are therefore appropriate targets of future interventions.⁴¹ Collecting empirical data within a theoretical framework facilitates the accumulation of evidence for downstream behavior.⁴¹ We were primarily concerned with assessing the extent to which people are informally implementing them into their current dialogues to support breastfeeding. However, it is unclear whether or not blog content changed breastfeeding behavior, since behavior was not measured. Nevertheless, it is possible that blog content could facilitate changes in social norms related to breastfeeding.

Limitations

The results of the present study should be interpreted in the context of certain study limitations. First, the present study was a content analysis and as such relied upon the subjective judgment of research assistants. To increase the likelihood of inter-rater reliability, research assistants were carefully trained as to the coding definitions and procedures. Second, the sampling frame was established using two electronic RSS feeds (Google Reader and Google Alerts). These online tools provide consumers a way to know when new content has been added to websites or blogs. While this method of sampling helped ensure a sample of active blogs, the sample may not be entirely representative of all types of breastfeeding blogs. Third, blog comparisons were limited to industry-affiliated and personal blogs. Government/NGO blogs may be valuable potential collaborators for health educators, but they were not included in this study since they were too few in number. Fourth, while the Integrated Behavioral Model acknowledges the importance of various indepen-

dent variables on behavior change,²⁹⁻³² this study made no attempt to explore breastfeeding behavior change directly due to the limitations of data collection among blogs. Future research might explore breastfeeding behavior by employing a research design that requires a reporting mechanism for recording a blogger's breastfeeding progress, which would result in more definitive conclusions about how blog content might provide behavior support. Finally, while credibility could be recognized as an important mechanism of behavior change among Internet interventions,⁵¹ it was also not directly studied due to the limitations of data collection among blogs. Future research could explore credibility (including authoritativeness and trust) across the different blog types (e.g., personal vs. industry) by directly assessing participants' perceptions of blog sites.

TRANSLATION TO HEALTH EDUCATION PRACTICE

Breastfeeding blogs provide a valuable medium for promoting breastfeeding behavior support. This study informs future research studies by helping to identify the current landscape of consumer interest for behavior support among breastfeeding blogs. As social media usage continues to grow, more research is needed to identify mechanisms for increasing the effectiveness of interventions in which blogging could be used to increase the frequency of breastfeeding.

Compared to personal blogs, industry-affiliated blogs provide more posts and comments that are supportive of behavior change. A greater number of posts and comments on the topic may be related to blog credibility, and credibility is based on consumers' trust of the blog sponsor. These findings suggest that industry-affiliated blogs engage blog participants in breastfeeding behavior support more than personal blogs. Partnerships with industry-affiliated blogs could be an important avenue for health educators regarding breastfeeding behavior support. At a minimum, health educators who have responsibility for maintaining or facilitating health education-related blogs

should work to establish trust with participants. As outlined by Smudde,¹⁰ the building blocks for trust when blogging include forthrightness, openness, consistency, timeliness, truthfulness, and candor.

Results also provide insight into how efforts aimed at increasing social media-mediated behavior change might be initiated. In this study, blog posts that focused on personal experiences about breastfeeding included more supportive comments for breastfeeding behavior change. Other studies confirm that discussing personal experience regarding a behavior such as breastfeeding is important for motivating participants to comment and change behavior. Health educators who wish to impact breastfeeding behavior through blogging should encourage blog participants to share their personal experiences with breastfeeding in addition to general information participants might provide about the topic. Limited one-way communication of content and the encouragement of two-way communication about personal experiences will provide additional support for behavior change.

REFERENCES

1. Nardi B, Schiano D, Gumbrecht M. Blogging as social activity, or, would you let 900 million people read your diary? *Proceedings of the 2004 ACM conference on computer-supported collaborative work*. 2004;6(3):222-231. Available at: <http://portal.acm.org/citation.cfm?id=1031643&coll=Portal&dl=ACM&ret=1>. Accessed July 9, 2010.
2. Nardi B, Schiano D, Gumbrecht M, Swartz L. Why we blog. *Communications of the ACM*. 2004;47(12):41-46.
3. Subrahmanyam K, Reich SM, Waechter N, Espinoza G. Online and offline social networks: Use of social networking sites by emerging adults. *J Appl Devl Psychol*. 2008;29:420-433.
4. Pempek TA, Yermolayeva YA, Calvert SL. College students' social networking experiences on Facebook. *J Appl Devl Psychol*. 2009;30:227-238.
5. Wright KB. Increasing computer-mediated social support. In: Parker JC, Thorson E, editors. *Health communication in the new media landscape*. New York: Springer Publishing Company,



LLC; 2009:243-258.

6. Papacharissi Z. Audiences as media producers: Content analysis of 260 blogs. In: Tremayne M, editor. *Blogging, citizenship, and the future of media*. New York: Routledge; 2007:21-28.

7. Herring SC, Scheidt LA, Wright E, Bonus S. Weblogs as a bridging genre. *Information, Technology & People*. 2005;18(2):142-171.

8. Herring SC, Kouper I, Scheidt LA, Wright EL. Women and children last: The discursive construction of weblogs. *Into the Blogosphere: Rhetoric, Community, and Culture of Weblogs*. Available at: http://blog.lib.umn.edu/blogosphere/women_and_children.html. Accessed September 23, 2010.

9. Scott LC. Late modern life and the rise of the "blogsphere": Can new media meet life's new challenges? *Annual Convention of the Association for Education in Journalism and Mass Communication*. Toronto, Canada; 2004.

10. Smudde P. Blogging, ethics and public relations: A proactive and dialogic approach. *Public Relations Quarterly*. 2005;50(3):34-39.

11. Pan American Health Organization. *Mother support maximizes life-saving benefits of breastfeeding in all countries of the Americas and the world, 2008*. Available at: <http://www.paho.org/english/dd/pin/pr080731a.htm>. Accessed September 25, 2008.

12. Gartner L, Morton J, Lawrence R, et al. Breastfeeding and the use of human milk. *Pediatrics*. 2005;115(2):496-506.

13. Pan American Health Organization. *The importance of exclusively breastfeeding for the first six months, 2008*. Available at: <http://www.paho.org/English/DD/PIN/pr040803.htm>. Accessed September 25, 2008.

14. Duckett L, Henly S, Avery M, et al. A Theory of Planned Behavior-based structural model for breast-feeding. *Nurs Res*. 1998;47(6):325-336.

15. Kools E, Thijs C, Vries H. The behavioral determinants of breast-feeding in The Netherlands: Predictors for the initiation of breast-feeding. *Health Educ Behav*. 2005;32(6):809-824.

16. Paine P, Dorea J. Gender role attitudes and other determinants of breast feeding intentions in Brazilian women. *Child Care Health Devel*. 2001;27(1):61-72.

17. Losch M, Dungy C, Russell D, Dusdieker L. Impact of attitudes on maternal deci-

sions regarding infant feeding. *Pediatrics*. 1995;126(4):507-514.

18. Racine E, Frick K, Strobino D, Carpenter L, Milligan R, Pugh L. How motivation influences breastfeeding duration among low-income women. *J Hum Lact*. 2009;25(2):173-181.

19. Chandrashekhar T, Joshi H, Binu V, Shankar P, Rana M, Ramachandran U. Breast-feeding initiation and determinants of exclusive breastfeeding: A questionnaire survey in an urban population of western Nepal. *Public Health Nutr*. 2007;10(02):192-197.

20. Martens P, Young T. Determinants of breastfeeding in four Canadian Ojibwa communities: A decision-making model. *Am J Hum Biol*. 1997;9(5):579-93.

21. Yngve A, Sjöström M. Breastfeeding determinants and a suggested framework for action in Europe. *Public Health Nutr*. 2001;4(2b):729-39.

22. Singh G, Kogan M, Dee D. Nativity/immigrant status, race/ethnicity, and socioeconomic determinants of breastfeeding initiation and duration in the United States, 2003. *Pediatrics*. 2007;119(Supplement):S38-S46.

23. Arora S, McJunkin C, Wehrer J, Kuhn P. Major factors influencing breastfeeding rates: Mother's perception of father's attitude and milk supply. *Am Acad Pediatrics*; 2000;106(5):e67.

24. Scott J, Binns C, Graham K, Oddy W. Temporal changes in the determinants of breastfeeding initiation. *Birth*. 2006;33(1):37-45.

25. Göksen F. Normative vs. attitudinal considerations in breastfeeding behavior: Multifaceted social influences in a developing country context. *Soc Sci Med*. 2002;54(12):1743-53.

26. Mitra AK. Breast feeding support from volunteer counsellors does not increase rates of breast feeding. *Evidence-based Healthcare*. 2004;8(4):202-204.

27. Raj V, Plichta S. The role of social support in breastfeeding promotion: A literature review. *J Hum Lact*. 1998;14(1):41-45.

28. Dennis C. Theoretical underpinnings of breastfeeding confidence: A self-efficacy framework. *J Hum Lact*. 1999;15(3):195-201.

29. Montano DE, Kasprzyk D. Theory of Reasoned Action, Theory of Planned Behavior, and the Integrated Behavioral Model. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education*. San Francisco, CA: Jossey-Bass; 2008. p. 67-96.

30. Fishbein M, Cappella J. The role of theory in developing effective health communications. *J Commun*. 2006;56:S1-S17.

31. Fishbein M, Yzer M. Using theory to design effective health behavior interventions. *Commun Theory*. 2003;13(2):164-183.

32. Fishbein M. The role of theory in HIV prevention. *AIDS Care*. 2000;12(3):273-278.

33. Kaye BK. Blog use motivations: An exploratory study. In Tremayne M, ed. *Blogging, citizenship, and the future of media*. New York: Routledge; 2007:127.

34. Sundar SS, Edwards HH, Hu Y, Stavrositu C. Blogging for better health: Putting the 'public' back in public health. In: Tremayne M, ed. *Blogging, Citizenship, and the future of media*. New York: Routledge; 2007. p. 83-102.

35. Webb T, Joseph J, Yardley L, Michie S. Using the Internet to promote health behavior change: A systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *J Med Internet Res*. 2010;12(1):e4.

36. Eichhorn KC. Soliciting and providing social support over the Internet: An investigation of online eating disorder support groups. *J Comput Mediat Commun*. 2008;14:67-78.

37. Internet World Stats. *Internet Usage Statistics, 2009*. Available at: <http://internetworldstats.com/stats.htm>. Accessed June 9, 2010.

38. Pierce J. *World Internet Project: International Report, 2010: USC Annenberg School for Communication and Journalism*. Available at: http://www.digitalcenter.org/pages/site_content.asp?intGlobalId=42. Accessed September 25, 2010.

39. Allen K, Rainie L. *Parents Online, 2002*. Available at: http://www.pewinternet.org/~media/Files/Reports/2002/PIP_Parents_Report.pdf. Accessed September 25, 2010.

40. Ningthoujam P. *Top 10 Social Networking Sites for Women, 2008*. Available at: <http://mashable.com/2008/05/11/top-10-social-networking-sites-for-women/>. Accessed June 9, 2010.

41. Michie S, Prestwich A. Are interventions theory-based? Development of a theory coding scheme. *Health Psychol*. 2010;29(1):1-8.

42. Mack R, Blose J. Believe it or not: Credibility of blogs in tourism. *Journal of Vacation Marketing*. 2008;14(2):133-144.

43. Berkowitz EN. The evolution of public



relations and the use of the Internet: The implications for health care organizations. *Health Mark Q.* 2007;24(3/4):117-130.

44. Takahashi Y, Uchida C, Miyaki K, et al. Potential benefits and harms of a peer support social network service on the Internet for people with depressive tendencies: Qualitative content analysis and social network analysis. *J Med Internet Res.* 2009;11(3):e29.

45. Eysenbach G. Medicine 2.0: Social networking, collaboration, participation, apomediation, and openness. *J Med Internet Res.* 2008;10(3):e22.

46. Eysenbach G. From intermediation to disintermediation and apomediation: New models for consumers to access and assess the credibility of health information in the age of Web 2.0. *Stud Health Technol Inform.* 2007;129(Pt 1):162-166.

47. Hughes B, Joshi I, Wareham J. Health 2.0 and medicine 2.0: Tensions and controversies in the field. *J Med Internet Res.* 2008;10(3):e23.

48. Fahy P. Indicators of support in online interaction. *The International Review of Research in Open and Distance Learning.* 2003;4(1). Available at: <http://www.irrodl.org/index.php/irrodl/article/viewArticle/129/209>. Accessed

July 8, 2010.

49. Boulos M, Wheeler S. The emerging web 2.0 social software: An enabling suite of sociable technologies in health and health care education. *Health Info Libr J.* 2007;24(1):2-23.

50. Jeong A. The effects of conversational language on group interaction and group performance in computer-supported collaborative argumentation. *Instructional Science.* 2006;34(5):367-97.

51. Ritterband L, Thorndike F, Cox D, et al. A behavior change model for Internet interventions. *Ann Behav Med.* 2009;38:18-27.